The Effect of Family Friendly Regulation on Fertility:

Evidence from Japan Using Natural Experiments

For the NBER Japan Project Meeting, Tokyo, July 30-31, 2015

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Abstract

Low fertility in Japan is a major policy focus. Many policies, such as an increase in replacement allowances during parental leave, have been rolled out with little evidence that they have had any effect on fertility nor on labor supply during 90's and early 2000's. This study assesses the impact on childbirth and labor supply of regulations designed to promote a family-friendly work culture from mid 2000's. The causal effects are identified by investigating two reform policies targeted at two different sized firms. The paper contributes to the literature on the effect of laws that impact changing organizational culture in a society where both gender and organizational norms are strong. The short-hour option reform significantly increased childbirth in working women who had been childless. Birth intent itself increased among childless women at the treated firms. At treated firms, the likelihood that women were more likely to take full-time permanent employment, at reduced hours following their first-childbirth. The policy was not significant for the second or the third births.

Key words: short hour option mandate, childbirth hazard, labor supply following childbirth

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[2] We would like to acknowledge that this research is aided by the competitive fund, obtained from MEXT and JSPS *Kinmirai no Kadai Kaiketsu wo mezashita Jisshoteki Shakaikagaku jigyo;* Empirical Social Science Research for the Impending Issue of Japanese Society, *"Jenda Kakusa Sensitive na Hatarakikata to Sekatsu no Chowa;* Work and Life Balance from Gender-Sensitive Perspectives—Designing Work Style that Enables Career Development, Family and Community Activities program," (Fiscal years 2008-2012, Nobuko Nagase, principal investigator) and the *Abe Fellowship* (2013-2015). We would like to thank that the micro-data use of *Panel Survey of Adults of 21st Century* collected by Ministry of Health Labor and Welfare was made under the due application process and permission required by Japanese Statistics Law.

[3] Prior paper analyzed data up to 2010. This new version added data of 2011 and 2012.

1. Introduction

East Asian economies experienced an ultra-low fertility rate in the 2000s, with the total fertility rate around 1.3 or lower. They are in search of policies that could positively affect fertility, even though it may not be easy to impact fertility through policy levers. The policy motive behind the 1991 passage of the law in Japan mandating unpaid parental leave with job protection was to increase fertility by reducing the opportunity cost of children for the working mothers. Research found that in the 1960s, fertility was higher in countries where more women stayed at home. After the 1990s, however, the relationship reversed so that fertility was higher in countries where more women participated in the labor market and had both work and family (Morgan (2003), Feyrer, Sacerdote and Stern (2008)). Interestingly, despite the series of leave provision enhancements, the employment behavior of women changed little.

Economic theory predicts that more women will exit the work force when there is no leave. But if there is leave, more women who have to quit will return to the pre-birth employer. Therefore, the labor supply of mothers will increase. (Klerman and Leibowits (1997)).

Instead, fertility continued to decline until it hit a historic low of 1.26 in 2005. Prior studies that focused on the effect of parental leave on fertility found that motivation to obtain a higher allowance can speed up the timing of fertility (Hoem (1993), Walker (1995), Laive and Zweimuler (2009)), and protected leave can increase the level of fertility in some cases (Averett and Whitingon (2001) for US, Ronsen(2004) for Finland and Norway). An employment

insurance-based replacement allowance introduced in 1995, which gradually increases over the years, nevertheless, seemed to show little if any influence on Japan's total fertility rate.

The unresponsiveness of rates of total fertility and labor force participation to these policy initiatives in Japan is baffling, especially since many studies using Japanese data show that full-time employment of women with children increased when companies provided leave (Higuchi (1994), Morita and Kaneko (1998), Shigeno and Ohkusa (1998), Higuchi and Abe (1999), Suruga and Cho (2003), Nagase (2003a), Takeishi (2011), Sato and Ma (2013)) as well as other international studies, (Ruhm (1998), Waldfogel, Higuchi and Abe (1999), Berger and Waldfogel (2004)、Baker and Milligan (2008), Laive and Zweimuler (2009), Han, Ruhm and Waldfogel (2009)), and that fertility rose in the working population (Morita and Kaneko (1998) , Laive and Zweimuler (2009), Ministry of Health, Labor and Welfare (2013)). Most Japanese research analyzed the provision of leave by company and, as a result, could have a potential bias based on the unobserved differences of the mothers who were hired at firms that provide access to leave. Research also might have been biased in that it mostly analyzed only the working population, while in Japan more women experience childbirth after deciding to leave the labor force. Asai (2014), using the difference-in-difference method, found that the 2001 leave allowance increase had no significant effect on the maternal labor supply. Results for US also using difference-in-difference method, showed insignificant results on labor supply of parental leave in some cases, for example, Klerman and Leibowits (1997) ,Waldfogel (1999) and Baum (2003).

Even though leave entitlement with job protection is an important device for allowing women to continue their employment, this paper hypothesizes that—for women to choose to

work after childbirth, and for employed women to be able to have children--the policy must be accompanied a family-friendly workplace culture. This is especially true for a country in which group norm and group culture are strong. Akerlof and Kranton (2000) stated that norms are the important determinants of the utility one gets from one's own action and also from the action of others. Japanese firms have a strong organizational culture requiring a high commitment by full-time regular workers. At the same time, society has also placed strong emphasis on motherhood. Unless the norms at the workplace and at home are changed to recognize them as legitimate members of the work team, mothers will feel penalized at work. In interviews in 1997 of workers at large enterprises in the Tokyo metropolitan and non-urban areas, Nagase (2006) found skepticism about leave-taking among many women—especially those in the Tokyo area, who do not expect to live with extended families where parents-in-laws can help with childrearing. Some women without children described how women who returned after parental leave had to apologize to their colleagues before dashing to day care centers after work; the childless women do not want to lead that kind of life. Another woman said she would prefer to be a full-time mother and take good care of any future children, even though she was not ready to leave the work force yet. In the Japanese long-term employment setting, one is often not hired for a *specific* job, but rather is hired for the long term and assigned by managerial initiative to a team. The job description of an individual worker, therefore, is not clear, and it is those workers who can flexibly cover a wide range of work within the team who gain high evaluations (Ishida((1989)). The workplace and court law also expects employees to work overtime whenever required. In the 2008 interviews, Nagase and Yamaya (2011) found that, because they must put in long hours of team work as well as keeping up their homemaking role, many women were still skeptical of the feasibility of balancing work and family. When these workers who

once leave employment at marriage or at childbirth re-enter the labor market, they are often employed as "part-time" workers who are low paid by hour (Yu (2002), Nagase (2003b)).

In an attempt to change work cultures that are not sympathetic to workers with families, government-mandated firms with 301 employees were required to set up action plans to increase the work and life balance. The schemes, for no shorter than two and no longer than five years' duration, had to be registered by 2005 with the local office of Ministry of Health, Labor and Welfare. In 2009, the government announced that workers with children under three can request shorter work hours (*e.g.*, six hours a day), and that the company cannot reject this request without legitimate reasons. This paper will empirically estimate the effects of these two policies as natural experiments. It will also see whether the birth intent among childless women increased as a consequence of improved feasibility of balancing work and family.

The reminder of the paper is as follows. Section 2 gives background information on the law change and previous research results. Section 3 discusses the estimation methodology. Section 4 describes the data. Section 5 presents the results. The first parts in Section 5 deal with the effect of two policies on the first-childbirth as well as marriage, and then on the second- and the third-childbirth. The second part deals the effect of short hour option mandate on work continuation and weekly work hour following the first-childbirth, and the third part the effect of two policies on strong child intention. Section 6 discusses the results and concludes the paper.

2. Background

After the total fertility rate fell to 1.57 in 1989, the Japanese government passed the Child Care and Family Care Leave Act in 1991, hoping to reduce the opportunity cost of children for women workers, and to give women the opportunity to have both children and careers. This law applied to *seishain*, full-time employees without termination of contract, we will call full-time permanent employees from hereon, and for those with more than one year of tenure. It protected them of their job during the leave that can last till their child reached one year of age. It applied to both mothers and fathers, though the take-up rate of fathers was near to zero. It did not apply to employees with a fixed-term contract—*e.g.* for one or two years. The mandate had a grace period until 1995 before it was extended to smaller enterprises with fewer than 29 employees. Maternity leave with job security has been available in Japan since 1947 to any employees including fixed-term employees. Female employees are eligible to take six weeks off before and six weeks (later extended to eight weeks) after childbirth. The drop in fertility initiated passage of a law that extended job-protected leave to a maximum of one year. Figure 1 shows that the average number of children declined by cohort, especially for the cohort born after 1963. University graduates in the 1963 cohort would feel the changing mood of society that followed passage of Gender Equal Employment Opportunity Law of 1985.

<Figure 1>

However, despite the leave entitlement, many mothers continued to quit after marriage or the birth of a first child. Childbirth continued to decline. Returning to full-time work with a one-year-old was not easy, especially since a full-time worker was expected to take on many responsibilities and to work overtime when necessary. When their children grew older, many

mothers who had left the labor market, re-entered it as "part-time" workers, but at much lower pay, and pay by the hour. Therefore, the opportunity cost of leaving full-time regular work was high.

One line of reform designed to increase the use of the leave was to increase the monetary allowance during the leave. The government started to give leave allowance. Starting in April 1995, the government gave the 25% (5% withheld) equivalent of daily salary from employment insurance. It increased to 40% (10% withheld) in January 2001 and to 50% (20% withheld) from October 2007 to 2010. To incentivize mothers to return to their pre-birth employers, the withheld portion of the allowance was refunded six months after they returned to their original workplaces.[4] Because the birth rate continued to stagnate, from April 2010, the government abolished withholding portion, and after April 2014, the monthly replacement became 50% and then 67% for the first 180 days.

The percentage of new mothers in labor force did not increase despite the policy. Figure 2 show the long-term trend of new mothers in the labor force when their children are age one. The repeated cross-sectional *National Fertility Survey* of 1992, 1997, 2002, 2005 and 2010 shows the longest time trend for a five-year average. The percentage of first-time mothers in the labor force was 23% for the first births in the late 1980s, 23% in the early 1990s after the introduction of the parental leave, 24% in late 1990s, and 26% in the first half of the 2000s. Using the Millennium Panel Survey of Adults' yearly labor participation average of mothers who had new born, we see

[4]About 85% of the leave-takers received the withheld portion, meaning about 15% quit work after taking the leave.

that the trend followed the National Fertility Survey, but the ratio jumped in 2009 and 2010 and further in 2011 and 2012.

<Figure 2 >

Another line of reform by the government was to offer flexible work hours and encourage a supportive culture within firms to balance work and family. Plus One Measure to Halt the Declining Birth Rate, announced by Ministry of Health, Labor and Welfare in 2002, pointed out that "revision of working patterns, including men's" was important. Changing men's working pattern of putting in long hours would make it easier for families to have children. When the legislature passed Act on Advancement of Measures to Support Raising Next-Generation Children of 2003, the government mandated firms with more than 300 employees to plan their work and family policies to meet their employee needs and to register a two- to five-year action plan at the local Ministry of Health, Labor and Welfare offices by 2005. Firms with good practices would be awarded a *"kurumin* seal" that could be printed on their products. In late 2007, the government, the main employers' organization, and the National Center of Labor Unions adopted The Work and Life Balance Charter.

The reform, proposed in December 2008 and passed in June 2009, was another large amendment to introduce flexible work hours for working parents. It mandated a short-hours option for workers with children under the age three. Sick leave to care for children, introduced in 2005, was doubled to ten days for parents with more than one preschool child. In addition, to encourage fathers to use the parental leave benefit, the leave was extended two months for

fathers.[5] After 2009, fathers were also allowed to take leave during the first eight weeks after a child's birth and a second leave sometime later. In December 2008, the action plan mandate for firms was also expanded to companies with more than 100 employees.

With the short-hour option legislated, starting in June 2010, companies with more than 100 employees were mandated to offer workers the a six-hour-a-day working option until the child reached three, and were barred from assigning overtime work to parents of preschool children. Firms with fewer than 100 employees were given a two-year grace period until July 2012. Therefore, if women working at firms with more than 101 employees had a child in 2009 or 2010, they could return to work with the short-hour option and no overtime work, while those women at firms with fewer than 100 employees would have the same benefit if they waited until 2011 to have a child.

The action plan register of 2005 and short-hour option of 2009 were aimed at easing child rearing along with full-time regular work. This change may increase marriage and childbirth among working women if the policy really eases the option to have both a full-time regular job and a child.

This paper will look at the effect of policies to increase work flexibility on fertility and work continuation. Our model predicts that leave policy will have positive impact on fertility only when females see that having both work and family improves their utility. We will utilize

[55]This increase in length may not have had much impact in major urban cities, however, since the law already had a clause extending the leave period by six months in 2005 if it was verified that government approved child care facilities were full, which was often the case in urban centers.

the "registration mandate" for employees at firms with 301 or more employees in 2005, and the "short-hour option" introduced in 2009 for firms with 101 or more employees.

3. Conceptual Framework and Estimation Strategy

3.1 Policy Change

We will use the *difference-in-difference* method to compare workers at firms with 101 or 301 or more employees and those at firms with 100 or fewer employees, and see if fertility or work continuation changed before and after the regulatory changes, controlling for other factors such as mother's age and educational level.

It is important to establish the causal effect of the policy on fertility, in light of the facts that leave policy enhancements intending to reduce the cost of quitting work after childbirth seemed to exert little influence on labor supply nor fertility in the past, and that policymakers as well as the media are becoming skeptical of the policy's effectiveness.

By using these policy changes as natural experiments, and by estimating whether significant change in birth and labor supply was evident right after the implementation of the policy in workers at mandated firms, compared to those at non-mandated firms, we can identify the causal effect of the policy. Workers at mandated firms (the larger enterprises) may, in their unobservables, be more qualified than workers at smaller firms. Yet, if the change in fertility behavior in workers at the larger firms, as compared to those at smaller firms is evident right after the implementation of the reform, the change must be due to the policy—not the result of the self-selection of workers to work at the mandated firms.

It is important, then, to identify when the employees knew about the reform. As to the short-hour mandate, the discussion about the reform started in August 2008, the Ministry of Health Labor and Welfare (MHLW) announced the policy proposal in December 2008,[6] and the law was passed in June 2009. According to Google trends, i*kuji tanjikan* (short-hour option for child care) was first discussed as a new term in May 2007, when the short-hour option for public servants was mandated. Use of the term increased from January to March 2009, shortly after the MHLW's December 2008 announcement of its policy proposal for the private sector. The law was on the table of the Diet beginning in April 2009, discussed at the House of Representatives on June 12, and passed into law by the House of Councilors on June 24, 2009. But by then, because the law was expected to pass, attention had already halved. Attention rose again in June 2010, at the start of implementation. We should consider the public announcement of the short-time option as late 2008 to early 2009. (See the google trend in Appendix.) Since workers were required to have one year of tenure before they were eligible for parental leave, they could not have self-selected into covered firms quickly enough to account for any positive relationship between childbearing and firm size by 2009 (short hour option).

It is more difficult to define policy timing for the mandated firms with 301 or more employees to make action plans to accommodate the work-life balance. Based on Act on

[6]The MHLW states that the revision of the leave law was discussed starting with the Cabinet's adoption of New Measure against the Declining Fertility in June 2006, and following the *Expert Group Report on Supporting the Work and Family Life for the Future,* released in August 2007. The Labor Policy Council Employment Equality Subgroup discussed leave reform at its 82nd meeting in August 2008. The final report of the National Commission on Social Security (November 2008) stated that the child care leave system should emphasize supporting flexible work styles, including a short working hour system. At the same time, the general workplace need to be changed by reducing long working hours for men (fathers) and by encouraging them to take childcare leave. www.mhlw.go.jp/english/policy/affiars/dl/05.pdf. At its 91st meeting in December 2008, the MHLW then proposed reform of mandating the short-hour option and implementation of a no-overtime for private employees who had children under three upon their request. Discussions and papers can be seen at the MHLW website.

Advancement of Measures to Support Raising Next-Generation Children of 2003, firms were required to make plans that suited the needs of their employees and to register them with local MHLW office by 2005. But because the action plans could vary from two to five years, and there were no specific requirements for their content, the result was that timing and content varied by firms.[7] However, in interviews I conducted in 2008 with personnel officers at eleven large enterprises, many officers said that the mandate resulted in personnel departments strongly recognizing the need for higher utilization of female employees and thinking about the future labor force structure. On December 3, 2008, an amendment to the law ordered firms with 301 or more employees to announce the action plan to the public beginning in April 2009; firms with 101 to 300 employees were required to publically announce in April 2011. This rollout partly coincides with the short-hour option period. Therefore, I will estimate the policy period as 2005 to 2008 for action plans. For 2009 onward, the policy effect of the action plan mandate will be measured together with the short-hour option.

3.2 Estimation Model

Beginning in April 2005, firms with 301 or more employees were mandated to register an action plan to improve their work environments with the local office of the Ministry of Health Labor and Welfare. For firms with 101 to 300 employees, the plans were not mandatory, but recommended. The MHLW also started acknowledging *nintei kigyou* (approved firms) beginning in 2007, allowing the use of "*kurumin*" or family-friendly seals on their goods and advertisements. To get approval for a *kurumin* seal, a firm must: have action plans for more than two and less than five years; realize the stated action plan goals; have some measures for workers with children between three and school age; have at least one male parental leave-taker; and have female take-up of child care leave exceeding 70%.

We can measure the causal effects of the regulations on the child birth hazard for working mothers, especially for the 2009 reform, since they needed to be employed for at least one year to be eligible for the parental leave. Consequently, if the child birth hazard rose right after the reform in 2009, it should not be the selection effect, but rather the effect from the change in regulation of 2009.

The marriage, the first-, second-, and third-child birth hazard for women in labor force one period before will be estimated. $Y1_{it}$ takes 1 among those who got married, or had their first child among those with no children, or second child among those with one child, the third child among those with two children. Hit is the vector of covariates, such as educational attainment and age category dummies, hourly wage rate at t-1, birth intentions at t-1. For the second and third childbirth hazard, log income of one's husband and domestic work hour of one's husband were included as explanatory variables.

We estimated not only the first-childbirth but also the marriage, as both sometimes occur simultaneously. In Japan, pre-marital sexual intercourse has become more socially accepted, but out-of-wedlock birth still not. Today, around one fourth of marriages in Japan occur after the conception of a child, either planned or unplanned. Out-of-wedlock childbirth is still rare (1.63% in 2000, 2.15% in 2010, and 2.21% in 2013), and cohabitation of non-married females in the age group of 18 to 34 is still low (2.8% in 1987, rising to 7.6% in 2002, but declining to 5.8% in 2010), according to the National Fertility Survey. On the other hand, premarital conception resulting in marriage, identified by a marital period less than the pregnancy period, was 12.6% in 1980, 21.0% in 1990, 26.3% in 2000, and levelled off to 25.3% in 2009. For women in age group 20 to 24, the figure was over 60% in 2009; for women in age

group 25 to 29, around 25% in 2009; while for women in the age group 30-34, it was little over 10%, according to Ministry of Health, Labor and Welfare Vital Statistics Special Report on Childbirth.

$firmsize_{i\,t-1}$ is a dummy variable that applies if one is employed at a firm included in the mandated policy. The short-hour option for firms with 101 and more employees was mandated to apply to employees who had birth in 2009-2010. For the birth 2011, the short–hour option is mandated to all employees with children less than three years old regardless of the firm size. The action plan mandate for firms with 301 and more employees took effect in 2005. Since the timing ambiguities may make assessing the action plan mandate more difficult, the effect of the 2009-2010 policy will be estimated first. Due to the firm-size categories asked in the questionnaire, we will use 100 instead of 101 and 300 instead of 301 for the firm size. Then, in another regression, we will have two cross terms with firm size of more than 300 and years 2005 to 2008, and the firm size more than 100 and the years 2009 and 2010. If $d_1$in equation (1) is statistically significantly positive, we will know that the action plan mandate, or short-hour option increased first child birth. I will estimate by fixed linear probability model.

$$Y1_{it} = a_1 + b_1 H_{it} + c_1 firmsizei_{t-1} + d_1 firmsize_{it-1} * (years\ after\ enactment\ of\ mandate\ of\ policies) + e_1 year\ dummy + u_{it} \quad (1)$$

As a next step, difference-in-difference-in-difference will be estimated to see the varying effects of the policy. The policy should affect those who had the first child at the treated firms after the policy enactment. $Y2_{it+1}$ is work continuation as full-time permanent employee

the next year and the weekly work hours for the next year. After the policy, if the policy was effective, the work hour t+1 of women who had a new born at t should become shorter at the treated firms with the short hour option mandate, and also the work continuation as full-time permanent employee at t+1 of women who had new born at t should be higher at the treated firms. d_2 in equation (2) should be statistically significant if the policy especially affected those females who were planning for their first child.

$$Y2_{it+1} = a_1 + b_1 H_{it} + c_1 firmsizei_{t-1} + c_2\, first\ childbirthi_t$$

$$+ c_3 firmsizei_{t-1} * first\ childbirth\, i_t +$$

$$c_4 first\ childbirthi_t * (years\ after\ enactment\ of\ policies)$$

$$+ c_5 firmsize_{it-1} * (years\ after\ enactment\ of\ policies)$$

$$+ d_2 firmsize_{it-1} * first\ childbirthi_t * (years\ after\ enactment\ of\ policies) +$$

$$e_1\ (year\ dummy\ including\ years\ afte\ enactment\ of\ policies) + u_{it}\ (2)$$

3.3 Parity Specific Effects, Childlessness and Child Intention

Policies to change work culture should have had the strongest impact on women who wished to have a child and continue to work, but hesitated because workplace norms did not support women with children taking on responsible work, or hesitated because of the long work hours. In Japan in the past, around 40% of women left the workforce at marriage and another 40% at the first childbirth. But the large adjustment ends mostly at the first childbirth, as evidenced in the National Fertility Survey (Nagase (1999)). Figure 3 using the Millennium Panel

Survey of Adults (the data this paper uses for its analysis), shows a similar picture for period from 2002-2010, in that leaving the work force at marriage and at the first birth is much more prevalent than leaving the work force at the birth of the second child.

<Figure 3 >

Therefore, the change in work culture may have the largest impact on women who hope to work as full-time regular employee after marriage and after having their first child. The work culture should also be important for the second and also the third birth, but other factors, such as a husband's sharing of child rearing, marital relationship, and the availability of daycare centers may be of equal importance to working mothers. Since we have questionnaires on husbands' domestic work hours on weekdays and on weekends in minutes, we made weekly domestic hours and weekend domestic hours of husbands as explanatory variables by dividing them by 60 to estimate the second- and third-child birth hazard. We also included log of husband's income in 10000 yen at t-1 as explanatory variables for the second and the third birth to account for the non-labor income of the wives.

As for explanatory variables other than firm size and policy years, we have educational attainment to account for differences in human capital, and year dummies to account for periodical influences such as economic fluctuation. Age dummies were also included as controls, since childbirth is related to age by biological limitations at the higher end and schooling and social norms at the lower end. Log of hourly wage of the females are also included to account for both the opportunity cost of time and also the available income.

We will also focus on women's intention to have a child to see if fertility declined because more women did not want a child or because they were constrained in their wish. The following question was asked to all the respondents each year, "Do you want to have any or another child?" The response options were "definitely yes," "yes," "cannot say," "no," and "definitely no." We made a dummy variable of one when the respondent answered "yes, definitely."

Figure 4 shows that the percentage of childless women who had strong intention of having children is increasing with years by the same age group. During the surveyed years, ratio of women who remained childless increased when controlling for the age category. Therefore, childless women increased at the same time when those who nevertheless replied that they definitely want a child increased.

<Figure 4>

4. Data

The paper will use the Millennium Panel Survey of Adults (MPSA), a nationally representative panel survey that follows cohorts of Japanese youth and was collected by the Ministry of Health, Labor and Welfare. Beginning in 2002, the MPSA has collected yearly information on labor market experiences, housework hours, birth and marriage intent and outcome, and the background characteristics of people between the ages of 20 and 34 and their spouses. They are interviewed annually; this paper uses up to the eleventh wave, surveyed in

2012. These are data on cohorts born from 1967 to 1982, who were 20 to 34 year of age in 2002, and 30 to 44 year of age in 2012. Therefore, we can follow their family formation. The original sample contained 14,150 females. The effective response rate was 82.8% for the first year, and then the follow-up rate was 82.2, 85.1, 87.9, 89.0, 90.0, 91.3, 92.4, 85.5, 82.4, 82.0 percents respectively for the following years. These allows us to examine women of child-rearing age and how they responded to the change in the parental leave law.

The panel structure allows us to control for individual differences in unobserved preferences and individual abilities. Birth timing may differ by unobservables, such as desire for children and fecundity. The advantage of these data is the large sample size and high response rate. Other existing panel data in Japan, such as Panel Data on Consumers, or KHPS (Keio Household Panel Survey) or JHPS (Japan Household Panel Survey) are smaller, with a lower response rate in the initial year as compared to the Millennium Panel Survey of Adults. The data have not been explored until very recently owing to restrictions on the use of micro-data imposed by the governmental statistics law.[8]

The shortcoming of these data is that they start in 2002. Even though we have retrospective data on past childbirth and marriage, we do not know past parental leave use, birth intent, and other variables, so we will only estimate the impact on behavior of law changes after 2002. For the purpose of analysis, we selected a sample of people who were working.

5. The Results

[8] Even today, one needs to go through the long application process, and the permission whether one is eligible and the document proper takes time. The term of use is also restricted.

5.1 Effect of Action Plan Mandate and Short-Hour Option on Marriage and the First-, Second- and the Third- Childbirth

Figure 5 shows the first-childbirth hazard by age group of women and by years that was surveyed. The dotted line shows the result for firms with less than 100 employees, and the bold line the result for firms with 100 and more employees. In 2009-2010, employees at firms with 100 and more employees were given option to work short hours till the child reached three. The fertility hazard seem to have risen for women working at such firms as shown in red bold line as compared to those without the option, shown by the red dotted line. In 2011-2012, all employees were mandated to be given option to work short hour. Interestingly, the first-childbirth hazard rose further at employees of both firms, with employees 100 and more as shown in green bold and, and employees with 99 and less in green dotted line. We need to take into effect other factors to verify the effect of the policy.

Table 1 shows the result of the effect of 2005 and 2009 policy on marriage and on the first childbirth while controlling for age of the women, year, educational attainment, log hourly wage of previous period, and the strong child intention in the previous period.

The first and the second column shows that the short-hour option policy had a significantly positive effect on marriage. It raised marriage hazard by around 2 percent, while the action plan mandate non-significant, as estimated by linear probability model. Yearly marriage rate during the survey years averaged around 5.8 percent for those who were working at t-1. Therefore, the 2 percent rise can be considered substantial.

The remaining columns show that the effect on the first-childbirth hazard. The short hour option policy had significant effect on the first childbirth, while the action plan mandate

again non-significant. Women working at firms with 300 and more employees are less likely to have any children. However, after controlling for the age of the women, year, educational attainment, birth intent at t-1, log hourly wage rate at t-1 and marital status, the first childbirth of childless women at firms with short hour option mandate increased by 1.0 to 1.2% in 2009 to 2010, as estimated by a fixed effect linear probability model. When marriage dummy was included, the magnitude of the effect become smaller. High child intention in the previous period exerted significant influence on marriage and also for the first birth. We found that the short hour option directly increased the first childbirth and also indirectly by increasing marriage. The average first-birth hazard during this period was 2.9% for those who are working at t-1. Therefore, the policy effect of short hour option mandate on the rise in first-childbirth can be seen as significant and large.

The base year for year dummies is 2003. Since we used 2002 data to obtain information of the previous year, the year dummy starts from 2003. It was the year when a bad economy raised the unemployment rate to 5.24%. The rate went down to 3.98% in 2008, but jumped to 5.06% in 2009 after the economic stagnation that followed the world financial crisis. Despite the upturn and then the downturn of the economy, the birth hazard for working women continued to rise as years went on, as shown in positive significant signs of the year dummy for the marriage and the first-child birth hazard. The effect of short hour option will be included in the 2011 and 2012 dummies after 2011, as the short hour option will be available to smaller firms as well, and the coefficient on dummies were significantly positive.

While higher hourly wage do not exert any influence on marriage, we found the same variable significantly discourage the first-childbirth hazard.

< Table 1>

Table 2 shows the effect of the action plan registration mandate and short-hour option mandate on the second- and the third-childbirth hazard. We see that neither of the cross term of the firm size and 2005-2008 dummy nor the 2009-2010 dummy was significant in all of the estimates. While the short-hour option policy significantly increased probability of working women with no children gaining their first child, the policy was not significant for a second- nor the third-childbirth. On the other hand, the effect of husbands' weekend domestic work hours on the second-child birth was significant and large. It was found that the increase in husbands' weekend domestic work contribution at t-1 has much explanatory power on whether the working women have a second child the following year or not. Higher husbands' income at t-1 also significantly increased the second-childbirth hazard.

On the other hand, none of the stated variables had any significant effect on the third childbirth hazard.

< Table 2>

5.2 Effect of Action Plan Mandate and Short-Hour Option on Work Hour and Full-time Permanent Work Status following the First- Childbirth

In order to look at the effect of the policy on labor supply, we will make a *difference-in-difference-in-difference* estimate of the policy, to see whether the policy affected the take-up of full-time permanent work following the first child for workers at the treated firms than those at the control firms. To avoid collinearity, we will only look at the effect of the short-hour option. The analysis was conducted to those who had no children at t-1 by linear probability fixed effect

model. Full-time permanent work status at t+1 was compared with those who had the first-childbirth at t at the treated firms and those without the policy effect. We found that women who had the first childbirth were significantly less likely to continue to work as full-time permanent employee in the next period, while working at larger firms encouraged their job continuation. Gender values, such as wanting to equally share income burden with the husbands significantly increased such employment. After controlling for such factors, the greyed row in Table 4 shows whether the policy had a significant effect on the full-time permanent employment of the women at t+1 when they had the first-child at t at firms that were affected by the policy. The sign of the cross term of firm size, year, and the first childbirth was significantly positive, indicating that the full-time permanent work increased following the first childbirth when short-hour option was mandated.

<Table 3>

Table 4 estimates the weekly work hours at t+1 of women who had no children at t-1. We will see whether the weekly work hour of those who had their first child at t became shorter after the short hour option mandate. The result shows that women employed at firms with more than 100 employees work significantly longer hours than those working at smaller firms. The work hour is reduced after the first childbirth. After controlling for such effects, the sign of the cross term of firm size, year, and the first childbirth was significantly negative, indicating that the work hour decreased at firms that had short hour option mandate following the first-childbirth. The weekly work hours following the first childbirth at the treated firms became around 3.4 hours shorter per week according to the estimate.

<Table 4>

We found that the short hour option increased full-time permanent employment following the first childbirth, while reducing the weekly work hours. However, we have to add that the explanatory power of the equation is low.

5.3 Birth Intent among Childless Women and Unmet Demand for Children

High Intention to have child will further be explored. Female fecundity declines with age, especially in the late thirties. Therefore, for those who definitely want, but are postponing a child, the mid-thirties may be a good time to seriously consider their schedule.

Figure 6 shows percentage of women who have a child or children at age 35 to 36. Termed workers, who have only limited access to parental leave entitlement, are the lowest percentage of those with children: 37% as of 2009-2010. Full-time regular workers, *seishain,* follow at 45%. Part-time workers, mainly hourly paid workers hired by hour, follow with 60% in 2009-2010. Those out of labor force have the highest percentage of motherhood at age 35 to 36: 81%.

<Figure 6>

High child intention was expressed by 35% of childless, full-time regular workers *(seishain),* and by 24% of childless females who were out of the labor force on average. When we see stronger desire, even though there is higher childlessness among full-time, regularly employed 35-36 year old females, such as *seishain* and fix-termed workers, it must be that they have preference for children, but their demand is unmet.

Reasons for an unmet demand for children can be various. For example, it could be not meeting the right partner, or waiting for the right time. However, it could also be difficulty in balancing work and family.

We will examine the unmet child demand by looking into the change in the strong intention to have a child $Y3_{it}$, for the working population without any children. The group that replied that they definitely want a child is a dependent dummy variable. This paper will see whether the policy change not only influenced the birth timing but also whether it increased the birth intent itself. If d_4 in equation (3) is positive for childless females, it shows that the reform increased their desire for children by reducing the child cost. Xit is the vector of covariates, such as educational attainment, log of hourly wage at t-1, and age category dummies. The intent will be regressed by fixed effect linear probability model, with the difference-in-difference setting, to see whose birth intention is most affected by the policy change.

$$Y3it_2 = a_2 + b_2 Xit + c_2 firmsizei_{t-1} + d_4 firmsizei_{t-1} * (year\ after\ the\ mandate\ of\ policies) e_3 * year\ dummy + u_{it} \quad (4)$$

Table 5 is the result of the linear probability fixed effect model of strong desire to have a child among childless working women. We would like to see if the natural experiment of 2005-2008 and 2009-2010 increased the strong desire among those without children.

We find the action plan mandate increased the women's strong desire to have child by 2.1% and the short hour option by 2.0%. Another factor affecting the strong demand for children

is the women's age. The strong desire decreases with aging. The wage rate did not exert any influence on the birth intent.

The significant effect of policy implies that for many working women, having child is less attractive when the work environment lacks family-friendly practices. When the work environment changed as to allow combining work and family, a larger fraction of childless working women expressed that they definitely want a child. Strong desire to have a child is a good predictor of child birth in next year, as evidenced in Table 1. Therefore, increase in attractiveness of having a child should help to increase the first-childbirth in the long run.

6.Concluding remarks

Despite the series of enhancements in parental leave law, childbirth has continued to be delayed in Japan for the past twenty years, and the number of births per population for the same age group has continued to decline for younger cohorts. Additionally, the proportion of females who returned to a pre-birth employer has not shown any significant increase in the past twenty years, despite favorable law changes. Because of long-term employment practices that predict a large drop in wages after a worker quits long-term employment, along with long and inflexible work hours, more women must have thought it more optimal to delay birth timing. The favorable law change was not enough to prompt women to have a child while continuing work until the implementation of new laws that increased work flexibility among long-term, regular workers with new born after 2009.

The contribution of this paper is in showing the importance of organizational and cultural changes that increase work flexibility by using the natural experiment of the two laws that increased work hour flexibility passed in 2003: to mandate the action plan register by 2005, and the short-hour option proposed in the late 2008 and legislated in June 2009. We used the largest and best suited panel data in Japan for this purpose.

Using these natural experiments that vary by firm size, we estimated the effect on fertility and job continuation using a linear probability fixed effect model. The result showed the first-child birth hazard effectively went up in the 2009-2010 period for those working at firms with more than 100 employees who can use the short-hour option after their return from the parental leave. The effect of the registration mandate, however, was not significant. The short hour option also significantly increased marriage in 2009-2010 period at the treated firms.

We also found that, during the policy period, the high intention to have a child significantly increased among the childless working women of the treated firms. The result can be interpreted as a new "flexibility" in work hours that made balancing work and family more possible and more attractive option. The increase in the child intention occurred not only by the short hour option but also by the action plan mandate.

While the policy significantly increased the first-childbirth and marriage, as well as the child intention among childless women, it did not show any significant impact on the second or the third childbirth. Husbands' domestic work contribution and husband's income level were important factors for working women to give the second-childbirth.

This delay in the first-childbirth may partly explain why the gap in the proportion of working mothers stayed about the same from 80s to early 2000s—in contradiction to the findings of previous research that leave entitlement increased return to pre-birth employers. Since a substantial fraction of women were delaying the first-childbirth, and many first child-births were still realized after quitting a job up to the early 2000s, the time series data showed small change until very recently in the fraction of women with and without work after the first child birth, while fertility declining. When the prospect of balancing both work and family improved, delayed birth among working population made an upturn.

The change in climate came in place slowly, along with series of efforts such as the adoption of the work and life balance charter by the business, union, and government, as well as with changes in the parental leave law, short hour option, and publicity around the firms' mandate of action plan.

Yet, we have to add that while the proportion of women who are able to continue work and have children is increasing, it remains still a small fraction of females in Japan. On one hand, the portion of women who have a full-time permanent employment contract without contract termination at graduation is decreasing. The portion of women with a fixed-term contract is rising. The latter have much weaker leave entitlement. Because of the difference in the job protection, companies may well increase this type of employment after considering that most of the regulation and protection extends only to long-term, regularly employed workers.

The evidence from Japan shows that implementation of parental leave policy, if it is not easy to use, may not increase fertility. On the contrary, it may even cause a delay in fertility. Only after the series of mandates created strong pressure on firms, combined with companies'

own recent internal effort to change the work climate and increase work flexibility (as evidenced in qualitative researches), did the laws finally show an impact on women's job continuation and fertility. However, there is still much unmet desire for children. Further steps to increase work flexibility, so that Japanese women can combine work and family, and so that men can be more involved in domestic work, should be one of the measures undertaken to help fill the unmet demand in Japan's fertility rate. The effect of the constraint caused by the inadequate number of subsidized day care facilities should be pursued in future research.

The limitation of this paper is the small number of years that have passed since the reforms. We need to see if fertility went up permanently, or if it only changed birth timing. Whether the law changes really eased constraints on having both work and family, or whether it only released some of the long awaited child demand is yet to be determined through further developments and the release of panel data gathered after 2012.

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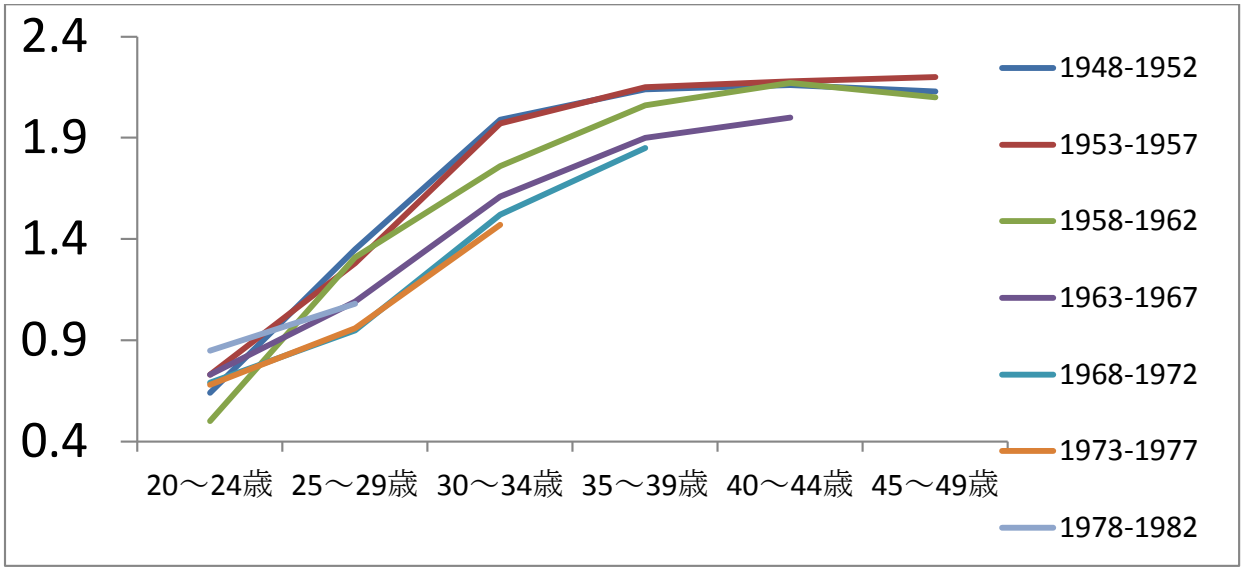
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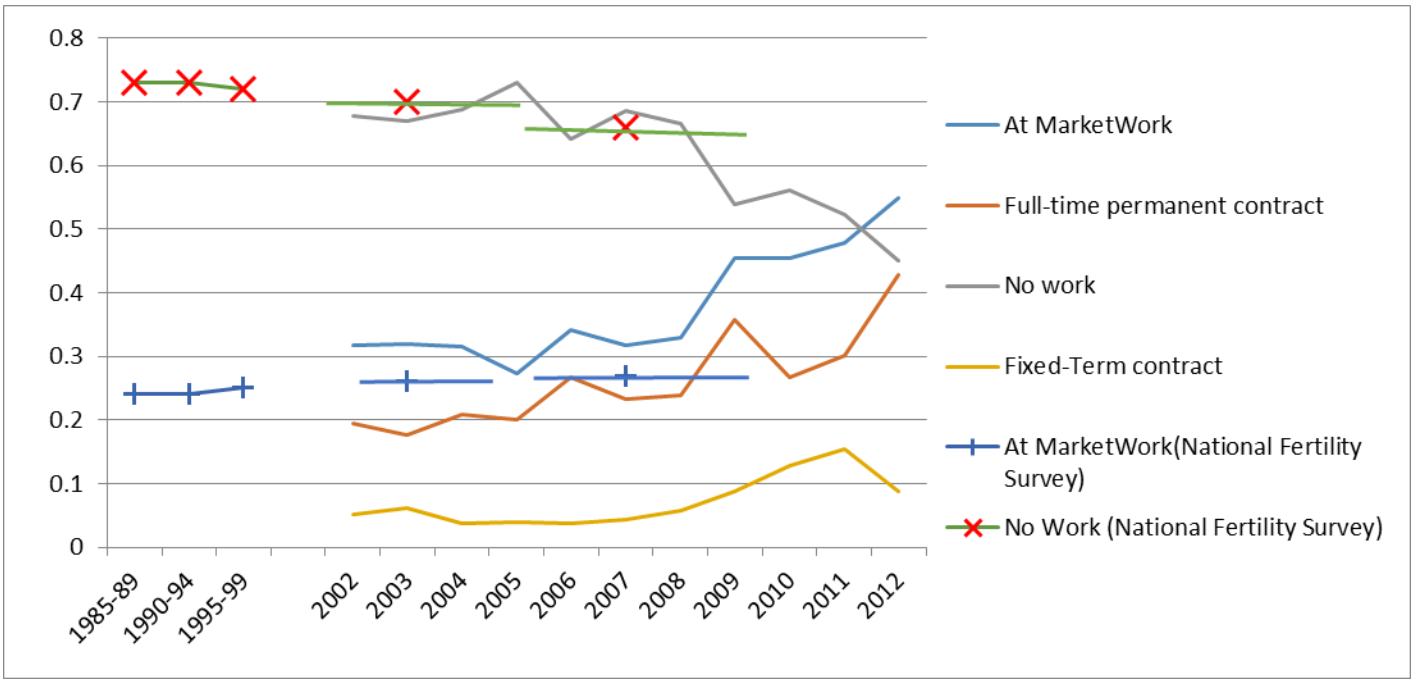
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Figure 1　Decline in Average Number of Children by Cohort



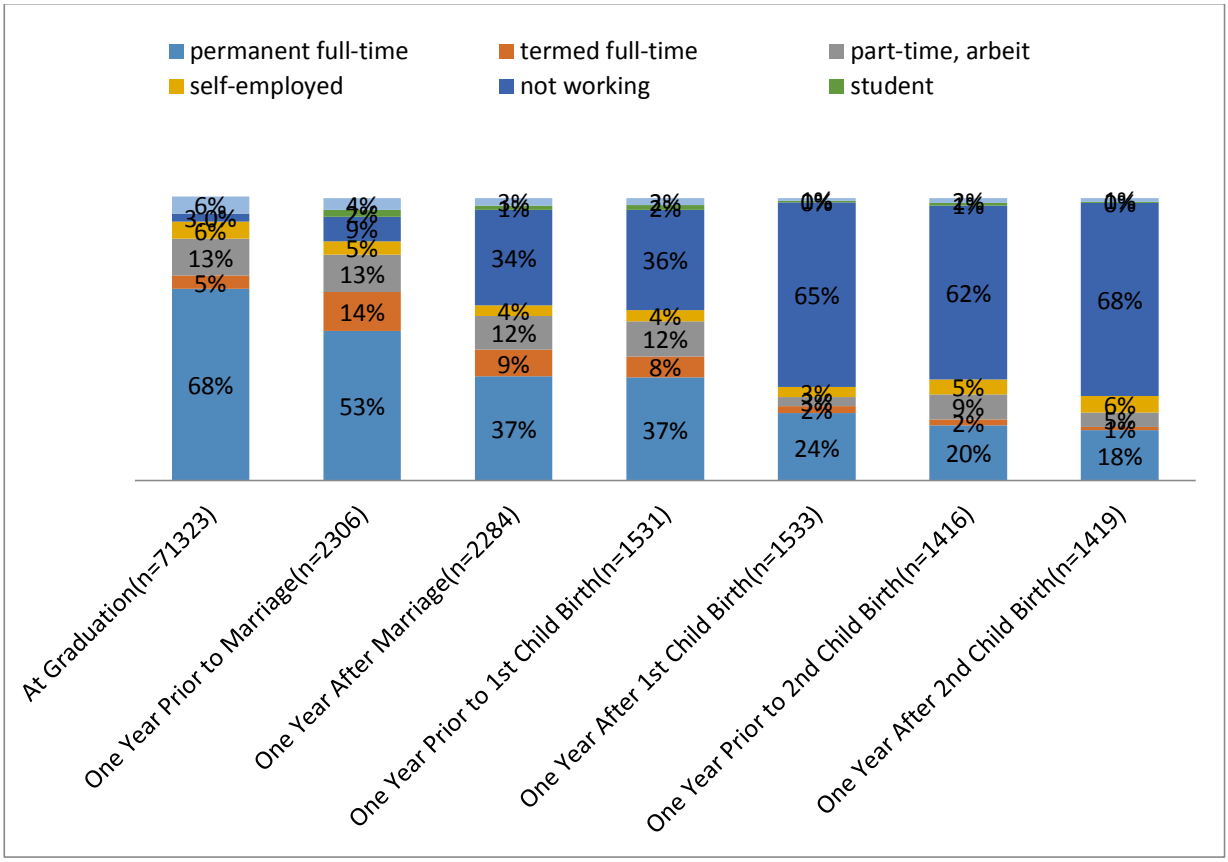
Source: IISPR　Statistics on Population

Figure 2 Percentage of Women in the Labor Force When the First Child is Age Zero to One



Source: IISPR *National Fertility Survey* of 1992, 1997, 2002, 2005, 2010, surveyed cross-sectional to women under age 49, shown as five-year average for 1985-1989, 1990-94, 1995-99, 2000-2004 and 2005-2009; 2009 until early June, as the survey was conducted in June of 2009. The yearly data from 2002 are made by the author using the panel data of Ministry of Health, Labor and Welfare *Millennium Panel Survey of Adults* conducted to females born in 1967 to 1982.

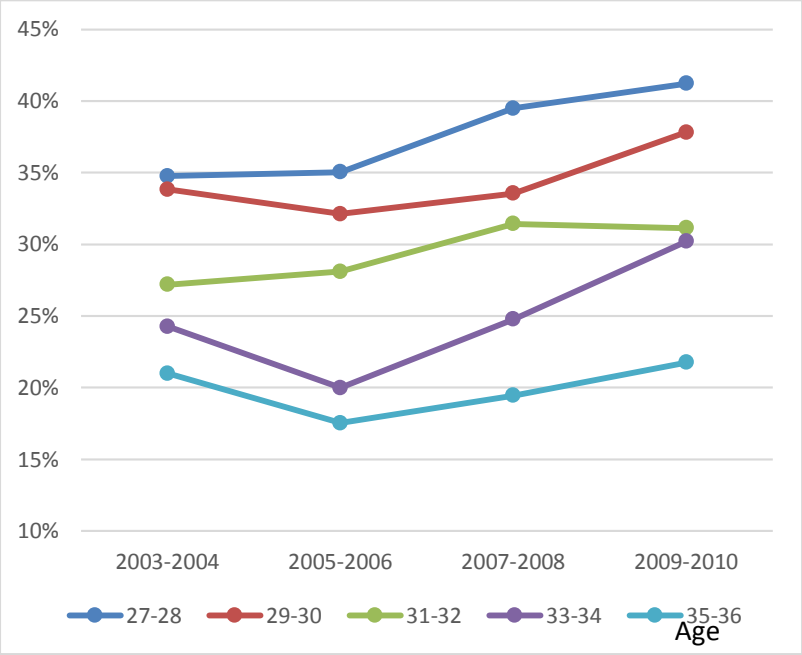
Figure 3 Change in Labor Status at Major Life Events



Source: Made by the author using the data of Ministry of Health, Labor and Welfare *Millennium Panel Survey of Adults*

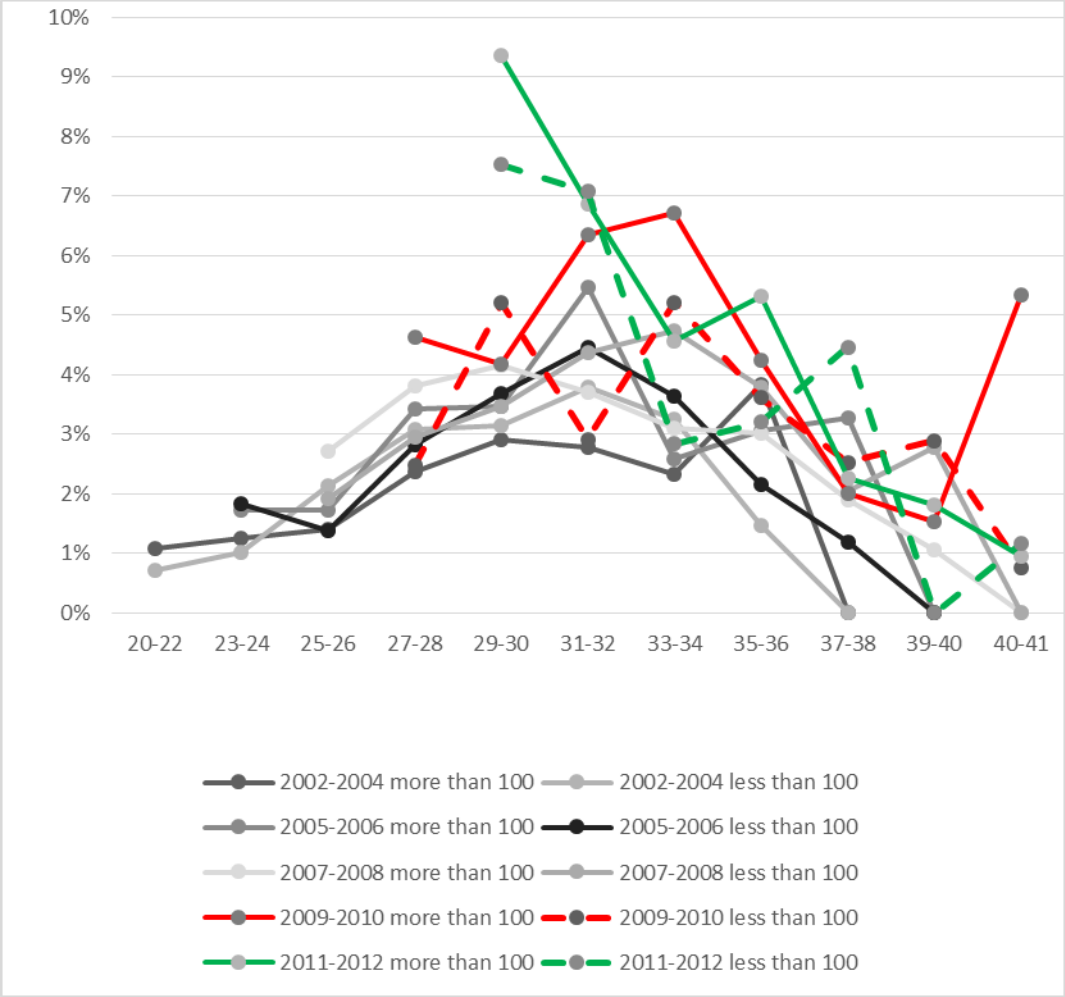
For marriage and births that occurred during 2002-2010

Figure 4 High Intention to Have Child among Childless Women



Source: Made by the author using the data of Ministry of Health, Labor and Welfare *Millennium Panel Survey of Adults*

Figure 5 First-Childbirth Hazard by Age of Women; Shown by firm size and surveyed years



Source: Made by the author using the data of Ministry of Health, Labor and Welfare *Millennium Panel Survey of Adults* In 2009-2010, firms with more than 100 employees were mandated to give short hour option till the child reach three. In 2011-2012, all firms were mandated to give short hour option.

Table 1 The Effect of Short Hour Option Mandate of 2009 and Action Plan Mandate of 2005 on Marriage and the First-Birth Hazard Using Linear Probability Model

		Marriage Hazard of Working Females				First Child Birth Hazard of Working Females with Short Hour Option				First Child Birth Hazard of Working Females with Action Plan Mandate and Short Hour Option			
		coefficie	t value	coefficien	t value	coefficien	t value	coefficier	t value	coefficient	t value	coefficient	t value
20-22	base age over 39	0.031	0.80	0.029	0.76	−0.018	−0.75	−0.024	−0.99	−0.019	−0.79	−0.026	−1.05
23-24		0.047	1.35	0.046	1.33	−0.022	−1.04	−0.028	−1.28	−0.023	−1.07	−0.029	−1.32
25-26		0.063	2.01 **	0.062	1.99	−0.019	−1.02	−0.023	−1.19	−0.020	−1.05	−0.024	−1.24
27-28		0.077	2.81 ***	0.076	2.79 ***	−0.019	−1.14	−0.017	−1.00	−0.019	−1.16	−0.018	−1.04
29-30		0.081	3.50 ***	0.081	3.49 ***	−0.012	−0.81	0.000	−0.03	−0.012	−0.82	−0.001	−0.06
31-32		0.072	3.79 ***	0.072	3.77 ***	−0.003	−0.24	0.012	1.01	−0.003	−0.26	0.012	0.98
33-34		0.056	3.67 ***	0.056	3.66 ***	0.003	0.35	0.018	1.88 *	0.003	0.34	0.018	1.86 *
35-36		0.039	3.42 ***	0.039	3.4 ***	0.009	1.30	0.022	2.95 ***	0.009	1.29	0.022	2.92 ***
37-38		0.025	2.94 ***	0.024	2.87 ***	0.007	1.23	0.013	2.39 **	0.006	1.18	0.013	2.29 **
2004	base year 2003	0.012	2.52 **	0.012	2.5 **	0.012	4.55	0.017	6.37 ***	0.012	4.60 ***	0.018	6.39 ***
2005		0.030	4.70 ***	0.029	4.3 ***	0.018	4.88 ***	0.029	7.51 ***	0.020	5.18 ***	0.031	7.58 ***
2006		0.048	6.04 ***	0.047	5.64 ***	0.021	4.29 ***	0.038	7.64 ***	0.023	4.59 ***	0.040	7.75 ***
2007		0.058	5.84 ***	0.056	5.54 ***	0.023	3.83 ***	0.046	7.35 ***	0.025	4.08 ***	0.047	7.44 ***
2008		0.080	6.67 ***	0.078	6.36 ***	0.020	2.76 ***	0.049	6.45 ***	0.022	3.00 ***	0.050	6.57 ***
2009		0.072	5.06 ***	0.070	4.89 ***	0.023	2.67 ***	0.055	6.20 ***	0.024	2.74 ***	0.055	6.18 ***
2010		0.087	5.32 ***	0.085	5.17 ***	0.018	1.76 *	0.057	5.52 ***	0.018	1.83 *	0.057	5.51 ***
2011		0.085	4.99 ***	0.085	4.94 ***	0.032	3.02 ***	0.074	6.69 ***	0.032	3.03 ***	0.074	6.65 ***
2012		0.102	5.46 ***	0.101	5.42 ***	0.026	2.27 **	0.073	6.12 ***	0.026	2.27 **	0.072	6.07 ***
marital status dummy						0.154	24.39 ***			0.153	24.23 ***		
high child intention		0.017	3.10 ***	0.016	3.01 ***	0.006	1.45	0.012	3.01 ***	0.005	1.41	0.012	2.92 ***
Log wage (t-1)		0.002	0.76	0.003	0.99	−0.008	−3.73 ***	−0.011	−4.68 ***	−0.008	−3.57 ***	−0.010	−4.44 ***
firmsize 300 & over (t-1)				−0.031	−5.81 ***					−0.018	−5.10 ***	−0.027	−7.38 ***
firmsize 300 & over(t-1)*(2005 to 2008)				0.004	0.81					−0.005	−1.45	−0.004	−1.10
firmsize 100 & over (t-1)		0.002	0.42	0.006	1.31	−0.003	−1.13	−0.004	−1.30	0.002	0.54	0.002	0.72
firmsize 100 & over(t-1)*(2009 to 2010)		0.019	2.44 ***	0.022	2.69 ***	0.010	1.84 *	0.012	2.14 **	0.009	1.56	0.012	1.98 **
below high school		0.046	1.11	0.045	1.07	−0.004	−0.14	−0.002	−0.09	−0.005	−0.16	−0.004	−0.13
junior college		−0.028	−0.77	−0.026	−0.71	−0.011	−0.50	−0.014	−0.67	−0.010	−0.46	−0.013	−0.60
university		−0.009	−0.30	−0.009	−0.29	0.009	0.38	0.020	0.87	0.009	0.39	0.020	0.87
graduate school		−0.002	−0.05	0.000	0.01	−0.003	−0.11	0.004	0.12	−0.002	−0.06	0.006	0.18
constant		−0.066	−1.48	−0.062	−1.39	0.046	1.63	0.068	2.42 **	0.047	1.67 *	0.070	2.49 **
number of obs		32449		32449		32449		32449		32449		32449	
number of groups		6966		6966		6966		6966		6966		6966	
R2	within	0.0205		0.0219		0.1035		0.0387		0.1047		0.0412	
	between	0.0016		0.0002		0.1409		0.0111		0.1392		0.008	
	overall	0.0036		0.0050		0.0968		0.0037		0.0966		0.0045	

Table 2 The Effect of Action Plan Mandate and Short-Hour Option on Second- and Third-Birth Hazard Using Linear Probability Model

		Second Child Birth Hazard of Working Females				Third Child Birth Hazard of Working Females			
		coefficier	t value	coefficier	t value	coefficien	t value	coefficier	t value
20-22	base age over 39	-0.801	-5.16 ***	-0.799	-5.15 ***	-0.424	-4.71 ***	-0.421	-4.69 ***
23-24		-0.451	-3.04 ***	-0.451	-3.04 ***	-0.346	-2.42 **	-0.348	-2.43 ***
25-26		-0.522	-4.49 ***	-0.521	-4.47 ***	-0.199	-2.49 **	-0.199	-2.51 ***
27-28		-0.344	-3.79 ***	-0.342	-3.77 ***	-0.107	-3.07 ***	-0.106	-3.05 ***
29-30		-0.190	-2.74 ***	-0.190	-2.73 ***	-0.052	-2.56 **	-0.051	-2.49 ***
31-32		-0.077	-1.44	-0.077	-1.43	-0.025	-1.60	-0.024	-1.54
33-34		-0.030	-0.72	-0.030	-0.71	-0.011	-1.03	-0.011	-0.99
35-36		0.033	1.08	0.033	1.10	0.002	0.25	0.002	0.27
37-38		0.025	1.17	0.026	1.19	0.003	0.49	0.002	0.47
2004	base year 2003	0.138	5.04 ***	0.136	5.01 ***	0.017	1.67 *	0.018	1.74 *
2005		0.125	4.36 ***	0.131	4.38 ***	0.027	2.44 **	0.030	2.67 ***
2006		0.122	3.9 ***	0.128	3.92 ***	0.025	2.36 **	0.028	2.58 ***
2007		0.117	3.26 ***	0.124	3.33 ***	0.024	2.20 **	0.027	2.43 **
2008		0.137	3.44 ***	0.143	3.50 ***	0.028	2.29 **	0.031	2.48 ***
2009		0.140	3.23 ***	0.142	3.22 ***	0.029	2.27 **	0.031	2.40 **
2010		0.163	3.47 ***	0.166	3.49 ***	0.022	1.62	0.023	1.76 *
2011		0.181	3.75 ***	0.180	3.72 ***	0.034	2.56 **	0.035	2.64 ***
2012		0.208	4.28 ***	0.207	4.26 ***	0.031	2.30 **	0.032	2.38 **
high child intention(t-1)		0.005	0.16	0.006	0.20	-0.009	-0.41	-0.009	-0.41
weekday husband's domestic work hour(t-1)		0.002	0.26	0.002	0.27	0.000	1.10	0.002	1.04
weekend husband's domestic work hour(t-1)		0.006	2.58 ***	0.006	2.56 ***	0.000	-0.50	0.000	-0.46
log husband's income(t-1)		0.044	2.23 **	0.045	2.26 **	-0.004	-0.87	-0.004	-0.90
firmsize 300 & over(t-1)*(2005 to 2008)				-0.027	-1.15			-0.027	-1.15
firmsize 100 & over (t-1)				-0.023	-1.05			-0.016	-2.03
firmsive 100& over (t-1)		-0.002	-0.1	-0.037	-1.45	-0.003	-0.58	-0.006	-0.76
firmsize100 & over(t-1)*(2009 to 2010)		-0.031	-1.25	0.009	0.41	-0.003	-0.49	0.003	0.42
log of wife's wage (t-1)		-0.005	-0.43	-0.005	-0.40	0.001	0.25	-0.005	-0.66
high school	base below high school	0.075	3.73 ***	0.057	2.38 **	0.083	4.71 ***	0.083	4.74 ***
junior college		0.113	2.37 **	0.104	2.18 **	0.030	2.47 **	0.029	2.45 ***
university						0.029	2.25 **	0.029	2.26 **
graduate school									
constant		-0.298	-1.85 *	-0.290	-1.82 *	-0.026	-0.63	-0.025	-0.63
number of obs		3420		3420		7357		7357	
number of groups		1239		1239		1885		1885	
R2	within	0.0962		0.0971		0.0230		0.0045	
	between	0.0535		0.0531		0.0300		0.0535	
	overall	0.0102		0.0095		0.0055		0.0102	

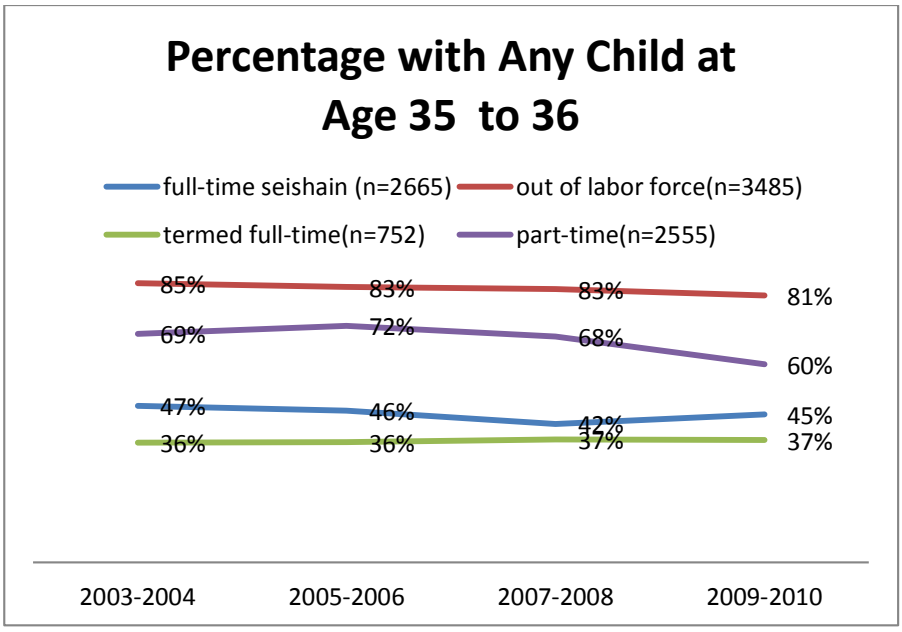
Table 3 The Effect of Short Hour Option Mandate on the Permanent Full-time Employment of Women One Year after They had the First Child at Treated Firms

		coefficient	t value
20-22	base age over 39	0.049	1.15
23-24		0.090	2.50 *
25-26		0.068	2.15 **
27-28		0.051	1.84 *
29-30		0.035	1.45
31-32		0.017	0.82
33-34		0.015	0.81
35-36		0.000	-0.02
37-38		-0.001	-0.11
2004	base year 2003	0.036	4.42 ***
2005		0.033	3.20 ***
2006		0.019	1.61
2007		0.023	1.70 *
2008		0.020	1.29
Policy(2009-2011)		0.007	0.39
1st childbirth(t)		-0.057	-4.61 ***
firmsize 100 & over (t-1)		0.112	10.91 ***
1st childbirth(t) * firmsize100 & ov(t-1)		0.011	0.40
1st childbirth(t) * Policy		-0.080	-3.43 ***
firmsize100 & ov(t-1) * Policy		0.016	1.55
firmsize100&ov(t-1) * 1st childbirth(t)*Policy		0.133	3.26 ***
want to equally burden household income with husband		0.018	1.94 *
want to equally burden child care with husband		0.002	0.22
Education years less than 9		0.036	0.29
below high school		-0.216	-1.72 *
junior college		0.090	0.80
university		0.131	1.14
graduate school		0.418	2.78 ***
constant		0.262	2.47 **
number of obs		22458	
number of groups		5697	
R2	within	0.0412	
	between	0.0862	
	overall	0.0703	

Table 4 The Effect of Short Hour Option Mandate on the Work Hour of Women One Year after They had the First Child at Treated Firms

		coefficient	t value	
20-22	base age over 39	-2.48	-1.24	
23-24		-0.87	-0.54	
25-26		-0.88	-0.63	
27-28		-1.26	-1.04	
29-30		-1.72	-1.65	*
31-32		-1.62	-1.81	*
33-34		-1.36	-1.86	*
35-36		-0.94	-1.63	
37-38		-0.26	-0.61	
2004	base year 2003	-0.22	-0.56	
2005		1.37	3.40	***
2006		-0.21	-0.44	
2007		0.31	0.56	
2008		0.01	0.02	
Policy(2009-2011)		0.32	0.31	
1st childbirth(t)		-18.52	-3.66	***
firmsize 100 & over (t-1)		2.54	4.08	***
1st childbirth(t) * firmsize100 & ov(t-1)		15.84	3.08	***
1st childbirth(t) * Policy		11.74	1.67	*
firmsize100 & ov(t-1) * Policy		-0.57	-0.75	
firmsize100&ov(t-1) * 1st childbirth(t)*Policy		-14.43	-2.02	**
Log of wage (t-1)		1.55	6.28	***
Education years less than 9		-5.22	-1.78	*
below high school		-5.91	-1.76	*
junior college		-1.72	-0.80	
university		-3.23	-4.25	***
graduate school		-4.33	-0.54	
constant		31.57	12.48	***
number of obs		13772		
number of groups		3899		
R2	within	0.0270		
	between	0.0195		
	overall	0.0164		

Figure 6 Percentage of Those Who Have Children at Age 35-36, by Work Status



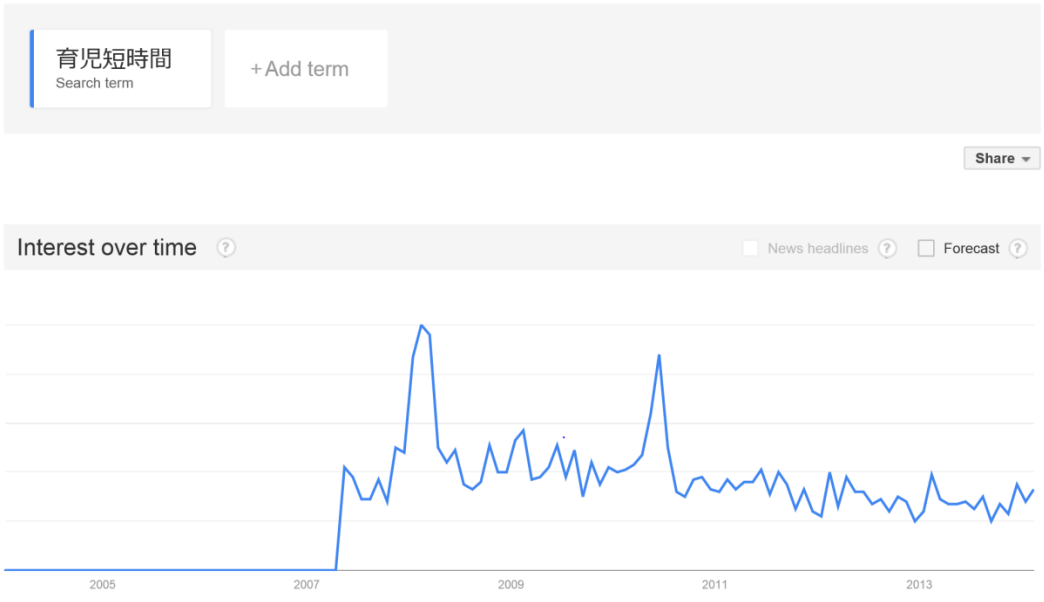
Source: made by the author using Ministry of Health, Labor and Welfare *Millennium Panel Survey of Adults*

Table 5 The Effect of Two Policies on the Strong Intention to Have Child

		coefficient	t value
20-22	base age over 39	-0.036	-0.77
23-24		0.015	0.37
25-26		0.047	1.30
27-28		0.050	1.58
29-30		0.053	1.93 *
31-32		0.056	2.39 **
33-34		0.048	2.40 **
35-36		0.028	1.82 *
37-38		0.017	1.53
2004	base year 2003	-0.005	-1.29
2005		-0.017	-1.66 *
2006		-0.022	-1.88 *
2007		-0.020	-1.44
2008		-0.019	-1.18
2009		-0.012	-0.63
2010		-0.037	-1.82 *
2011		-0.031	-1.48
2012		-0.022	-0.96
firmsize 300 & over (t-1)		-0.001	-0.18
firmsize 300 & over(t-1)*(2005 to 2008)		0.021	2.31 **
firmsize 100 & over (t-1)		0.000	-0.01
firmsize 100 & over(t-1)*(2009 to 2010)		0.020	1.82 *
Log wage (t-1)		-0.004	-0.87
below high school	base high school	-0.171	-2.13 *
junior college		-0.053	-0.91
university		-0.025	-0.38
graduate school		-0.118	-1.07
constant		0.393	5.85 ***
number of obs		32661	
number of groups		7019	
R2	within	0.0048	
	between	0.0003	
	overall	0.0015	

Appendix

Appendix Table 1 Google Search for *"ikuji tanjikan,"* short-hour option



Appendix Table 2 Means of the Data Used for Table 1 and Table 2

	Childless Working Females				Working Females with One Child				Working Females with Two Child			
	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max
First Childbirth	0.029	0.168	0	1								
Second Childbirth					0.118	0.323	0	1				
Third Childbirth									0.025	0.155	0	1
Marrying	0.058	0.234	0	1	0.000	0.000	0	0	0.000	0.016	0	1
marital status dummy	0.217	0.412	0	1	1.000	0.000	1	1	1.000	0.000	1	1
age 20-22	0.031	0.174	0	1	0.000	0.017	0	1	0.000	0.012	0	1
23-24	0.082	0.274	0	1	0.005	0.068	0	1	0.001	0.023	0	1
25-26	0.125	0.331	0	1	0.018	0.133	0	1	0.005	0.070	0	1
27-28	0.147	0.354	0	1	0.049	0.217	0	1	0.017	0.128	0	1
29-30	0.153	0.360	0	1	0.100	0.300	0	1	0.042	0.202	0	1
31-32	0.134	0.341	0	1	0.136	0.343	0	1	0.089	0.284	0	1
33-34	0.113	0.317	0	1	0.164	0.370	0	1	0.142	0.350	0	1
35-36	0.090	0.286	0	1	0.175	0.380	0	1	0.197	0.398	0	1
37-38	0.060	0.238	0	1	0.140	0.347	0	1	0.188	0.391	0	1
39-40	0.038	0.191	0	1	0.107	0.309	0	1	0.156	0.363	0	1
40-41	0.027	0.161	0	1	0.107	0.309	0	1	0.164	0.370	0	1
2003	0.159	0.366	0	1	0.107	0.309	0	1	0.063	0.244	0	1
2004	0.137	0.344	0	1	0.089	0.285	0	1	0.071	0.257	0	1
2005	0.125	0.331	0	1	0.089	0.285	0	1	0.080	0.271	0	1
2006	0.116	0.320	0	1	0.096	0.295	0	1	0.098	0.298	0	1
2007	0.104	0.305	0	1	0.099	0.299	0	1	0.106	0.308	0	1
2008	0.092	0.290	0	1	0.102	0.303	0	1	0.114	0.318	0	1
2009	0.083	0.276	0	1	0.103	0.304	0	1	0.115	0.319	0	1
2010	0.070	0.256	0	1	0.106	0.308	0	1	0.116	0.320	0	1
2011	0.060	0.238	0	1	0.106	0.308	0	1	0.118	0.323	0	1
2012	0.052	0.223	0	1	0.101	0.302	0	1	0.118	0.322	0	1
high child intention(t-1)	0.322	0.467	0	1	0.237	0.425	0	1	0.034	0.182	0	1
log hourly wage (t-1)	7.057	0.643	1.291	12.134	6.874	0.803	2.813	11.472	6.825	0.773	1.897	12.008
log f husband's yearly income in 10000 yen (t-1)					5.947	0.488	1.099	8.006	6.021	0.483	0.000	9.105
weekday husband's domestic work hour in hour (t-1)					1.360	1.419	0	24	1.225	1.297	0	14
weekend husband's domestic work hour in hour(t-1)					4.966	4.413	0	24	4.854	4.366	0	24
firmsize 300 & over (t-1)	0.337	0.473	0	1	0.306	0.461	0	1	0.250	0.433	0	1
firmsize 300 & over(t-1)*(2005 to 2008)	0.161	0.367	0	1	0.127	0.334	0	1	0.104	0.306	0	1
firmsize 100 & over (t-1)	0.528	0.499	0	1	0.461	0.499	0	1	0.384	0.486	0	1
firmsize 100 & over(t-1)*(2009 to 2010)	0.080	0.272	0	1	0.094	0.292	0	1	0.089	0.285	0	1
less than high school	0.026	0.158	0	1	0.027	0.162	0	1	0.019	0.136	0	1
high school	0.239	0.427	0	1	0.356	0.479	0	1	0.461	0.499	0	1
junior college	0.466	0.499	0	1	0.441	0.497	0	1	0.408	0.492	0	1
university	0.252	0.434	0	1	0.168	0.374	0	1	0.108	0.311	0	1
graduate school	0.017	0.127	0	1	0.010	0.101	0	1	0.004	0.059	0	1
sample size	32449				3240				7357			

Appendix Table 3 Means of Variables used in Table 3

	Mean	Std.Dev	Min	Max
full-time Permanent work t+1	0.426	0.494	0	1
20-22	0.033	0.180	0	1
23-24	0.083	0.276	0	1
25-26	0.123	0.329	0	1
27-28	0.146	0.353	0	1
29-30	0.155	0.362		
31-32	0.136	0.343	0	1
33-34	0.115	0.319	0	1
35-36	0.094	0.291	0	1
37-38	0.060	0.237	0	1
2004	0.141	0.348	0	1
2005	0.131	0.337		
2006	0.121	0.326	0	1
2007	0.111	0.314	0	1
2008	0.101	0.301	0	1
Policy(2009-2011)	0.231	0.421	0	1
1st childbirth(t)	0.057	0.231	0	1
firmsize 100 & over (t-1)	0.684	0.465	0	1
1st childbirth(t) * firmsize100 & ov(t-1)	0.013	0.115	0	1
1st childbirth(t) * Policy	0.015	0.122	0	1
firmsize100 & ov(t-1) * Policy	0.143	0.351	0	1
firmsize100&ov(t-1) * 1st childbirth(t)*Policy	0.005	0.072	0	1
wkwage3	0.365	0.481	0	1
wkikuji3	0.861	0.346	0	1
Education years less than 9	0.012	0.109	0	1
below high school	0.251	0.433	0	1
junior college	0.430	0.495	0	1
university	0.271	0.444	0	1
graduate school	0.017	0.131	0	1
sample size	22458			

Appendix Table 4 Means of Variables used in Table 4

	Mean	Std.Dev	Min	Max
Weekly Whour Hour(t+1)	40.593	10.981	1	120
first child birth	0.0205	0.1416	0	1
20-22	0.0249	0.156	0	1
23-24	0.0847	0.278	0	1
25-26	0.1311	0.337	0	1
27-28	0.1508	0.358	0	1
29-30	0.1550	0.362	0	1
31-32	0.1324	0.339	0	1
33-34	0.1139	0.318	0	1
35-36	0.0901	0.286	0	1
37-38	0.0611	0.239	0	1
2004	0.1393	0.346	0	1
2005	0.1352	0.342	0	1
2006	0.1200	0.325	0	1
2007	0.1144	0.318	0	1
2008	0.1052	0.307	0	1
Policy(2009-2011)	0.2371	0.425	0	1
1st childbirth(t)	0.0205	0.142	0	1
firmsize 100 & over (t-1)	0.8946	0.307	0	1
1st childbirth(t) * firmsize100 & ov(t-1)	0.0169	0.129	0	1
1st childbirth(t) * Policy	0.0075	0.086	0	1
firmsize100 & ov(t-1) * Policy	0.1978	0.398	0	1
firmsize100&ov(t-1) * 1st childbirth(t)*Policy	0.0067	0.081	0	1
Log of wage (t-1)	7.1548	0.606	2.996	10.021
Education years less than 9	0.0113	0.105	0	1
high school	0.2252	0.418	0	1
junior college	0.4393	0.496	0	1
university	0.2926	0.455	0	1
graduate school	0.0190	0.136	0	1
sample size	13772			

Appendix Table 5 Means of Variables used in Table 5

	Mean	Std.Dev	Min	Max
High intention for Child	0.319	0.466	0	1
20-22	0.031	0.173	0	1
23-24	0.082	0.275	0	1
25-26	0.125	0.331	0	1
27-28	0.147	0.355	0	1
29-30	0.152	0.359	0	1
31-32	0.134	0.341	0	1
33-34	0.113	0.317	0	1
35-36	0.090	0.286	0	1
37-38	0.060	0.237	0	1
2004	0.136	0.343	0	1
2005	0.131	0.337	0	1
2006	0.115	0.319	0	1
2007	0.103	0.305	0	1
2008	0.092	0.289	0	1
2009	0.083	0.276	0	1
2010	0.070	0.255	0	1
2011	0.060	0.238	0	1
2012	0.052	0.222	0	1
firmsize 300 & over (t-1)	0.337	0.473	0	1
firmsize 300 & over(t-1)*(2005 to 2008)	0.162	0.368	0	1
firmsize 100 & over (t-1)	0.527	0.499	0	1
firmsize 100 & over(t-1)*(2009 to 2010)	0.080	0.271	0	1
Log wage (t-1)	7.057	0.644	1.291	12.134
high school	0.239	0.427	0	1
junior college	0.466	0.499	0	1
university	0.252	0.434	0	1
graduate school	0.017	0.128	0	1
	32661			